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The Pathology of Follicular Cysts of Canaries: *Hypopteronosis cystica.*

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The disease of canaries, known to many fanciers as "Lumps," appears to have been identified in this country for many years. Henry Gray, who is distinguished in England for his pioneer clinical studies of the diseases of cage birds, informs me that he has recognised it for at least 30 years in the "plainhead," "crest-bred" and "crest" varieties. He has described its clinical appearances and treatment in many fancier's journals. Under the designation "Federhorner" Hennemann (1909) describes a case, but from the brief reference to such a lesion in the text-books by Reinhardt (1922), Otte (1928) and v. Heelsbergen (1929) it would appear that little notice has been given to the disease by continental writers. The macroscopic appearances of the developed lesion has been described under the title of "a peculiar feather tumour of the canary," by Crew and Mirskaia (1931).

The following observations are based on the pathological examination of six "plainhead" and two "crest-bred" canaries. The owners of these eight cases (Table I) stated that they first observed the lesion during or following, but not before, the moult, which is usually of 6-8 weeks duration (July-September).

TABLE I.

SHOWING THE ONSET, NUMBER AND SITUATION OF THE FOLLICULAR CYSTS IN EIGHT CANARIES.

Case No.	Sex	Lesions. Onset	Number	Situation
5968	M	2nd moult	Single	R. wing (proximal digit)
5986	M	2nd „	Multiple	Dorsal region; both radii (Fig. 1).
5992	M	2nd „	Multiple	R. breast (6); radii; L, metacarpal (Fig. 2).
5997	M	2nd „	Two	Coccyx; R. breast (Fig. 3).
5998	M	1st „	Single	L. radius
6050	M	1st „	Four	Breast
6065	M	2nd „	Multiple	Dorsal region; coccyx; L. breast; scapulæ
6798	F	2nd „	Single	L. scapula

The table shows that the initial manifestation of the disease may occur at the first or second moult, but an additional case recently examined arose at the fourth moult. No. 6050 was aged five weeks when the first "lump" appeared at the end of July, 1928, and No. 5998 was 12 weeks old, in July, when the owner observed a "tiny pimple" as the initial lesion. In the other six birds no sign of the disease appeared until the second moult.

Either sex is susceptible. The lesions may appear on any part of the skin, usually they are found on the wings, breast, back and tail; they are usually multiple, 12 being found on one bird; sometimes only one "lump" is found (Figs. 1, 2, and 3). The smallest macroscopic lesion in these eight cases was the size of a pin-head, firm, raised and of a faint yellow opaque colour; but the "lumps" may rapidly increase in size so that within four weeks of the termination of the moult the lesion may have grown to the size of a hazel-nut (vide, the coccyx of No. 5997, Fig. 3). When dissected with the aid of a Zeiss prismatic binocular lens X3, the large lesions (millet-seed to hazel-nut size) are found to be monolocular bosselated cysts (lying between skin and muscle) the cavity of which has a smooth lining and is filled with keratin, immature feathers and a small quantity of sebaceous material. These contents are readily shelled out on incising the skin and cyst wall, and are cleared for microscopic examination by immersion in alcohol, followed by 10 per cent. KOH.

The colour of the lesion is due to the pigment of the immature feathers which in all-yellow birds is yellow and in variegated birds may be yellow, black or variegated. After the moult one or more of these immature feathers may project through the skin. Commonly the canary, by continuous pecking, partly empties the cyst, leaving tufts of immature feathers standing out from the depths of the lesion (Figs. 2 and 3). In one of these eight cases the canary had pecked away almost the entire contents of the cyst, the size of a cherry, situated on its breast. The adult feathers growing from the skin over and around the lesion may conceal smaller lumps but the larger lumps are usually very conspicuous and may impede the bird's movements.

PATHOLOGICAL EXAMINATION.

No abnormality other than the specific lesions was found at *post-mortem* examination.

The smallest lesion observed, *viz.*, the size of a small pin-head, together with its surrounding skin was cut in serial section and stained by hæmatoxylin and eosin and by Van Gieson (No. 5992). It was a multilocular cyst (Fig. 4), the wall of which was composed of three layers. An outer tunic of thin fibrous tissue separated the cyst from the overlying skin and the underlying muscles. A middle layer, which was of varying thickness, was composed of loose connective tissue, some plain muscle cells (? remains of erector muscle) and an abundance of blood vessels. The inner lining consisted of squamous epithelium. The greater part of the lumen of the cyst was divided into two large compartments which represented two cysts, A

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and B, conjoined through atrophy of their opposed epithelial linings; each of these compartments contained an immature curled-up feather which was surrounded by multiple layers of keratinised epithelial scales. The feather in cyst A was attached to its root (*a*), which was undergoing absorption; the feather in cyst B was detached from its root (*b*). The lumen of three other cysts C, D and E, oval in shape and much smaller than A and B, communicated with the cavity of the main lesion owing to atrophy of a part or whole of the dividing epithelial linings. Each of these small cysts contained one or more embryo feathers, each of which was attached to a root containing a functioning papilla. At one pole of the lesion and between the cysts C and D, the middle layer of the wall was thickened owing to the presence of some buds of actively proliferating epithelial cells (Fig. 4 F.). The cells of the periphery of each of these buds resembled those of the Malpighian layer of the epidermis, whereas the centre was composed of older cells undergoing keratinisation. Two of these buds revealed early cavity formation owing to keratinisation of the cells at their centres (Fig. 7). A bud in a more advanced stage of development (Fig. 6) showed a cystic centre filled with layers of keratinised epithelium from which there radiated a series of processes composed of cylindrical shaped epithelial cells which were arranged at right angles to the axis of the process. Each of these processes resembled a normal feather follicle in its early stage as a downgrowth from the epidermis. At the apex of one of these processes there was an ingrowing capillary suggesting the early formation of a papilla.

Some of the sections also passed through a single early cyst which was situated at some distance from the lesion already described. The lumen of this cyst (Fig. 8) contained a feather rudiment growing from a root, the blood vessels of which were clearly distinguished. The structure of this cyst was similar to that of the larger lesion. It also was completely isolated from the overlying skin.

Sections were also cut through the wall of a cyst, the size of a hazel-nut (No. 6050). It was not possible to differentiate an outer and middle layer of the wall of this cyst, which was composed of dense fibrous tissue showing here and there remnants of a lining of flattened epithelium, one cell thick.

Both in histological sections and various kinds of smear preparations, before and after death, no evidence of a parasite or inflammatory exudate was found in the lesions. No result followed the subcutaneous inoculation of a rabbit with 2 c.cms. of a saline emulsion of the contents of a lesion from No. 6050.

Discussion.

The pathogenesis of the lesion, which is a follicular cyst, is suggested from the preceding observations. The solid downgrowth of cells from the Malpighian layer of the epidermis, proceeding to the formation of a feather-follicle, becomes cut off from the epidermis. Though isolated within the subcutis the bud of epithelium proliferates at its periphery while the cells at its centre keratinise forming a cavity. Meanwhile, by condensation of the subcutis, the bud is invested by a connective tissue layer which contains blood vessels. From these blood vessels a capillary grows up into the bud, forming a papilla around which the epithelial cells become differentiated into a root of a feather. The feather rudiment grows into the cystic centre which enlarges owing to growth of the feather and accumulation of keratinised epithelium. The feather fails to perforate the wall of the cyst, which becomes progressively more dense as the lumen enlarges; it becomes curled up and its growth is arrested. The bud of epithelial cells may give rise to multiple feather rudiments, the number of which would depend upon the number of vascular papillæ growing into the bud. Meanwhile, the original bud of epithelium has given off daughter buds (somewhat resembling the solid outgrowths of an epithelioma) and each of these develops into a cyst containing immature feathers. Through atrophy of the dividing epithelium, probably the result of pressure, the lumena of cysts eventually become united to form the multilocular cyst obvious to the naked eye.

Henry Gray and several fanciers have informed me that following the incision of the cyst and removal of its contents the lesion may recur at the same site.* The histology of the lesion suggests two possible explanations of this phenomenon. Firstly, so long as the proliferation and development of epithelial cells into follicles continues within the cyst the lesion will recur on simple removal of the contents. From the experiments of Martin (1929) and others on the production of a moult by dosage with thyroid it would appear that this proliferation and development persists so long as the thyroid hormones remain active, *i.e.*, so long as the physiological moult persists. Incidentally, no macroscopic abnormality was found in the thyroid glands of the eight cases. Secondly, even after the cessation of the moult, provided one or more immature feathers remained attached to their papillæ within the cyst, the opening of the cyst would release the pressure and enable the contained feathers to grow. Some such explanation appears reasonable for the fact that lesions may show poorly developed feathers projecting from the depths of a cyst, the coverings of which have been pecked away by the bird after the cessation of the moult.

The view of Crew and Mirskaia (1931) that the development of the lesion " is due either to an excess of fat which the growing feather cannot utilise, or to an inability on the part of the growing feather to utilise fat of normal amount " finds no support from these observations.

The essential cause of the lesion, namely, the isolation in the subcutis of the downgrowing epidermal cells, is not understood. The evidence suggests that it is occasioned by an hereditable factor. Gray (1928) has found that affected birds are almost invariably heavily feathered and of weak constitution and not infrequently faint or even die when handled by strangers. Breeding histories of only two cases were obtained, the other six birds were purchased from dealers. (1) Of three chicks in the clutch, No. 6050 was the only one to show lesions during and after the first moult. Neither the mother, aged seven years, nor her parents and grandparents, had been affected. The father's history was unknown previous to the last five years, during which time he had not shown any signs of the disease. (2) The parents of No. 5998 were bred by two different fanciers and were purchased by the present owner in 1927. They were mated in 1928, reared four

* N.B.—Gray states that there is no recurrance of the lesion provided the cyst after removal of its contents is cauterised with $AgNO_3$.

FIG. 1.
Photograph, dorsal aspect of No. 5986. Chain of cysts in midline of dorsal region and single cyst over upper third of each radius.

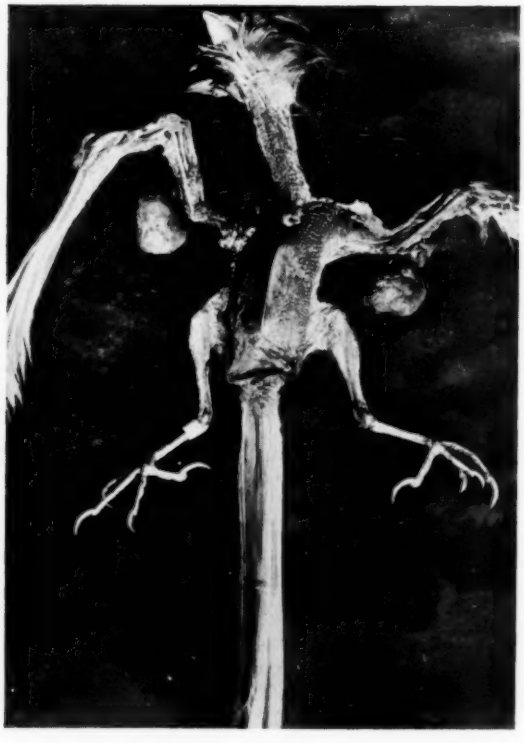

FIG. 2.
Photograph, ventral aspect of No. 5992. Bird had pecked away part of the cyst (between the coracoids) from depths of which a tuft of immature feathers project. Note large cysts on either wing.

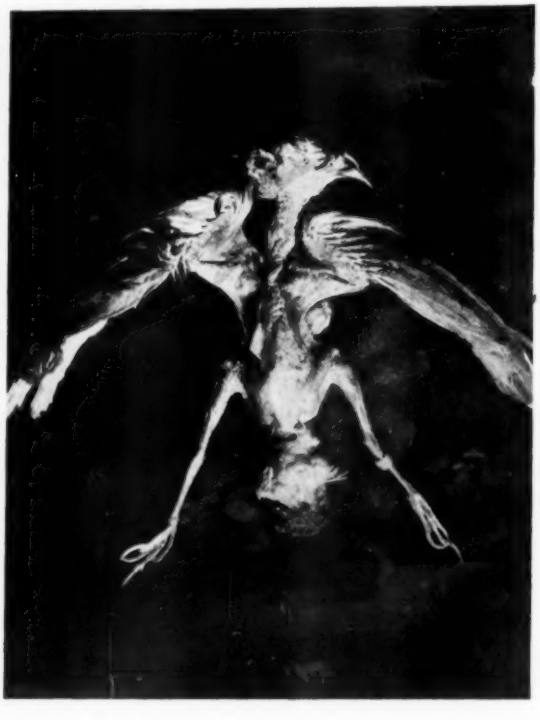

FIG. 3.
Photograph, dorsal aspect of No. 5997. Immature feathers projecting from large ruptured cyst on the tail.

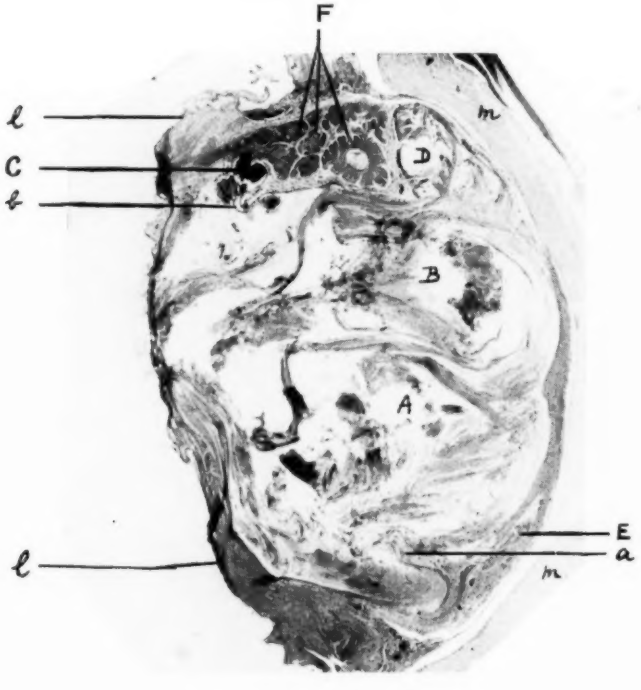

FIG. 4.
Photomicrograph x25 (Van Gieson) of pin-head sized cyst of No. 5992. Part of the overlying epidermis (l) and subcutis became folded over in mounting the section. Two large cysts, A and B, containing immature feathers, the roots of which are marked a and b respectively. The lesion is separated from the deeper striated muscles (m) and skin (l) by a fibrous capsule.

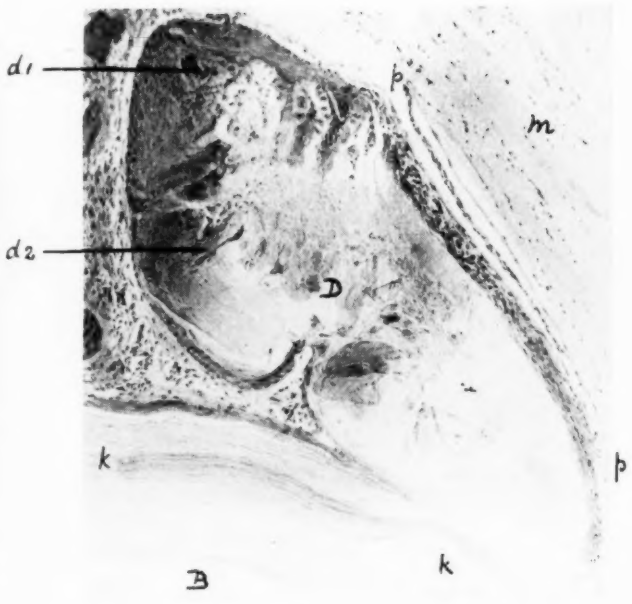

FIG. 5.
Photomicrograph x300 (H and E) of small cyst D of Fig. 4. It contains two embryo feathers attached to papillæ at d1 and d2. Its lumen communicated with the large cyst B, the epithelium of which is lined by layers of keratin (k). Striated muscle (m) and outer fibrous capsule of lesion (p).

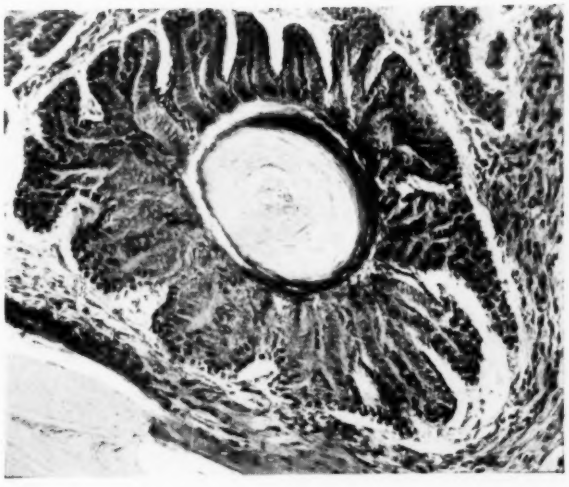

FIG. 6.
Photomicrograph x340 (Van Gieson) of the formation of a cyst containing keratin within a bud of epithelium (at site marked F in Fig. 4).

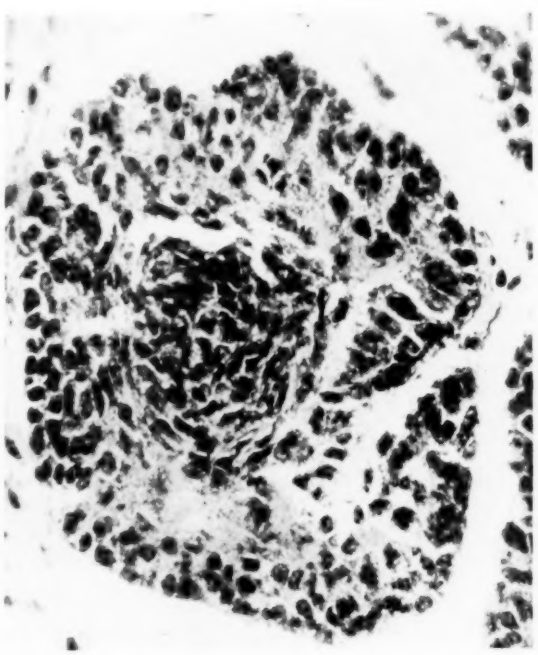

FIG. 7.
Photomicrograph x750 (Van Gieson) of keratinisation of cells leading to cavity formation at the centre of a bud of epithelium. Malpighian cells at periphery of the bud are actively proliferating. Earlier stage than Fig. 6.

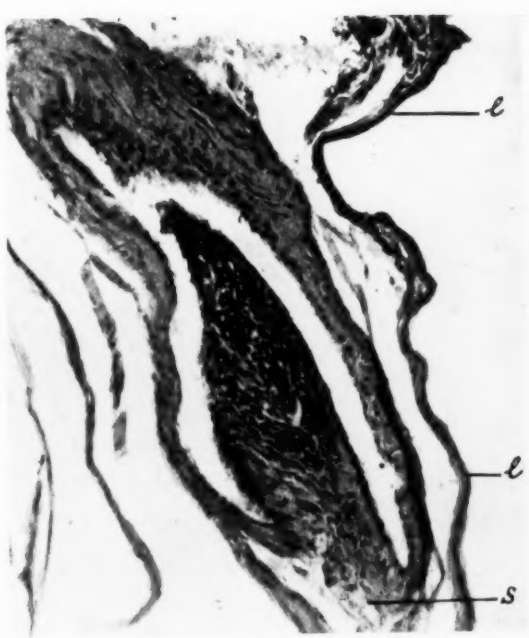

FIG. 8.
Photomicrograph x375 (Van Gieson) of a solitary cyst within the subcutis. A feather rudiment is growing into the lumen from its papilla (S). Normal skin (l).

chicks from two clutches and at the moult (their second) both developed the disease. Of the four chicks, three became affected, No. 5998 at its first moult (1928), a second at its second moult (1929), and a third at its fourth moult (1931); the fourth chick, when sold two months after its first moult, had not shown signs of the lesions.

Gray (1928), assuming the disease to be infectious, terms the lesion a " skin abscess," but no evidence of an infectious origin has been found in these cases. Crew and Mirskaia (1931) found that the disease is not infectious or contagious.

Conclusions.

(1) The clinical appearances, pathology and pathogenesis of the disease of canaries known to fanciers as " lumps " are described.

(2) The lesion is a cyst, single or multilocular, of a feather follicle, which arises during one of the moults.

(3) It is suggested that the disease be termed *Hypopteronosis cystica*, its pathology being similar to the *Hypotrichosis cystica* of swine.

(4) The disease appears to be an hereditable defect of epithelium.

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Vibrionic Diarrhœa in Cattle.

F. S. Jones and R. B. Little (*Journ. Exper. Med.*, June 1st, 1931, p. 835) have studied a disease of cattle which occurs in epidemic form during the autumn and winter months in certain parts of the United States. It is characterised by the passage of dark brown or blackish-brown liquid fæces, often containing mucus and blood, and is sometimes known as winter dysentery and sometimes as black scours. The mortality appears to be low, but the milk yield is seriously affected both during and after the attack. Experimental feeding of calves with fæces from spontaneous cases gave rise to a similar but milder disease. Cultures made from the inflamed jejunum yielded vibrios which, on being fed in pure culture to fresh calves, sometimes produced an enteritis similar to that occurring in the natural disease. In another paper (ibid., p. 845) the authors describe a similar infection of calves. Animals two weeks or more old are affected; they are unhealthy in appearance, and often have a chronic diarrhœa accompanied by the passage of fæces varying from clay to dark brown in colour, with sometimes blood and mucus. The disease is apparently most common in the autumn. Vibrios were recovered from the mucosa of the upper jejunum and occasionally from the liver. One strain which had been recently isolated produced severe enteritis when fed to a calf, and the organisms were recovered from the jejunum. In a third paper (ibid., p. 853) F. S. Jones, M. Orcutt, and R. B. Little describe the characters of the vibrios with particular reference to *Vibrio fetus*, to which they are closely related. They propose the name of *Vibrio jejuni* for the new organism.—*British Medical Journal.*

Discussions on Papers Presented to Congress.

No. 3.—The Calcium and Phosphorus Supply of Dairy Cows.

By

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The Stuart Hall, Norwich, was the scene of this discussion, which took place on the morning of Wednesday, August 26th, 1931, when Mr. T. Eaton Jones (Liverpool) presided over an excellent attendance of delegates to Congress.

The Chairman said that he would ask Dr. Stewart to open the discussion, as they had all no doubt read the paper by Professor Linton.

Dr. J. Stewart (Cambridge): I think we must all be very grateful to Professor Linton for the lucid manner in which he has laid before us the pros and cons of a problem which, during the past few years, has been the cause of much discussion and contention in the dovecots of research.

As Professor Linton has pointed out, the problem of the necessary supply of lime and phosphate depends on the minimal daily requirements of the animals and also on the utilisation of the supply offered. The utilisation or absorption of these constituents in the animal body, however, is not only dependent on the amount of lime and phosphate present but may also be affected by the presence of an excess or deficit of one or more of the other mineral constituents of the ration and indeed is not independent of the nature and amount of the organic constituents. Bearing this in mind, I think that it is unwise to put a figure such as 20 per cent. as the average percentage of calcium assimilation. It is probably much higher. It is known that under the most favourable conditions the calcium of milk is absorbed to the extent of 80 per cent. As you have heard, Huffman, Robinson and Winter have recently shown that on a diet of timothy hay, maize silage and grain, dairy cows absorbed 34·2 per cent. to 57·6 per cent. of the calcium in their ration. Others have shown that if the calcium supply of the ration is low it is more efficiently assimilated and, again, if the cow be a heavy producer it makes a more efficient utilisation of the supply offered in the food. These facts have made most people agree that the Kellner standards of requirements are practically correct.

Another point of dissension regarding the supply of such minerals has been whether or not it is necessary to have a balanced ratio between the calcium and phosphorus content to get a maximum assimilation. In my own opinion the Ca/P can vary within fairly wide limits and produce no effect on the milk production. In the mechanism of milk secretion it is becoming more and more evident that calcium and phosphorus play independent rôles. Meigs and his co-workers even suggest feeding calcium and phosphorus on alternate days when adding a mineral supplement to the ration, since one seems to hinder the absorption of the other. It is also known that there is a surplus of inorganic phosphorus in the active mammary

gland (over what is required for milk production) whilst no such surplus of calcium can be observed. Haag and others found that Ca/P might be extremely high without producing any ill-effect. Huffman and his co-workers deduced from 132 experiments that the actual intake of those minerals was of much greater significance than the ratio of one to the other as regards the utilisation of them by the animal body. These results, therefore, lead me to believe that in the past too great attention has been paid to this factor. If we neglect it much greater scope can be allowed us in the selection of winter rations for dairy cattle as we can then confine ourselves to calculating the actual intake of calcium and phosphorus without the narrowing factor of getting the ratio correct. Of course there are limits to which we must confine ourselves, but I am firmly convinced that they need not be the narrow ones suggested in the past. Let us, therefore, consider the rations of dairy cows, bearing these facts in mind.

It is agreed that pasture grass supplies more than the necessary amount of lime and phosphate for even the heaviest of milk producers. Woodman, Blunt and myself, in a paper on the nutritive value of pasture, gave figures covering two summers' work. We assessed the daily requirement of a four-gallon cow as 70 gms. calcium and 41 gms. phosphorus. On the pasture we were investigating in 1925 a cow eating 30 lb. dry matter would have obtained 150 gms. of Ca and 62 gms. P, but on the field of our 1926 investigation it would have obtained 119 gm. Ca and 65 gm. P. These figures, although they at once demonstrated the huge excess of Ca and P above the requirement, also show the great variation between the pastures. During the season of 1925 the lime/phosphate varied as follows: in April 1·09/1, in July 2·09/1, and in October 1·24/1. These figures show that even on pasture dairy cows must ingest a food the lime/phosphate of which varies within wide limits. It is evident that on a good pasture, dairy cows during the summer months have a ration which enables them to lay down a big reserve of calcium and phosphorus. Also, we must remember that the cow, owing to its big structure, is capable of laying down a bigger store of mineral than most animals and for this reason alone it is difficult to produce any symptoms of mineral deficiency during a short period of deficient rations. The figures I have given for pasture grass are typical of any good pasture and probably hold for nearly 95 per cent. of those on which dairy herds are allowed to graze. However, of late we have been examining the grasses on the hill farms of Northumberland and if we take two of these as examples, a cow eating 30 lb. dry matter per day would only obtain 40 gm. Ca and 18 gm. P from one and 32 gm. Ca and 17 gm. P from another—less than the quantity required to produce one gallon according to the Kellner standard. It would be interesting to know if the practitioners in areas such as these find that many dairy cows lose their bloom quickly and show signs of digestion trouble, and a falling off in milk production.

On winter feed, however, the case is quite different. As Professor Linton points out, the supply of calcium and phosphorus in most stall-fed rations comes very near the margin of requirement. The question we have to discuss is whether it ever oversteps the margin to any serious extent. To my mind it very very seldom does. Professor Linton has given us three typical rations which he has calculated might produce a negative calcium balance on a four-gallon per day cow. However, the figures he has given us for hay are for the most part very low. I should just like to ask him if it is usual to have dairy herds in all the areas from which these hays were sampled. The important point, however, is whether such a ration would produce a calcium deficiency. It is very doubtful if the small apparent difference between the total calcium content of the ration and the standard requirement would produce any significant effect on the animal. It is difficult to estimate what a small negative balance really means. Every animal shows a tendency to get into a state of equilibrium and if the standard of feeding is changed the animal must readjust its metabolism before it gets back again to a state of equilibrium, and a negative balance is usually just observed when it is changing from a higher standard of feeding to a lower standard of feeding. In the case of the dairy cow its easiest way to regain equilibrium after the lowering of the calcium content in the ration is to increase its assimilation of this constituent, which I have already pointed out it is quite capable of doing. Therefore, if a small negative balance is calculated, as Professor Linton has done in the case of these three rations, we must also remember that the animal can adjust its own mechanism to cope with it. The reserve which the animal has accumulated in the summer months is much greater than the amount necessary to tide it over such a small demand. Of late the belief that a dairy cow existed in a state of negative balance on such winter rations has been questioned by several writers. Huffman and his co-workers kept a 2,000-gallon cow in a state of positive calcium balance on a ration of timothy hay, maize, silage and grain. Other workers have shown that if only good hay is used there is no need of a mineral supplement to keep the cow in a state of positive balance. From the nature of the usual type of foodstuff used there is usually an excess of phosphate above the requirement, and if we allow that the Ca/P ratio can vary within wide limits without producing any serious disorder in assimilation we need have no fear of any phosphate deficiency.

Considering all these points I believe that there is little danger of any lack of supply of phosphorus and calcium in the usual type of ration fed to the dairy cattle of this country. However, I should just like to draw your attention to one system of feeding, whereby mixed concentrates are substituted for the greater bulk of the hay in the ration of deep milking cows. In this scheme, put forward by Boutflour, an eight-gallon cow would be receiving 28 lb. of mixed concentrates and only 6 lb. of hay, and this certainly possesses the danger of a big drain on the animal's reserve of calcium and phosphorus which would probably soon be seen in any calves which these cows subsequently produced. Under such a scheme of feeding I think a farmer would be well advised to add a mineral supplement in the form of chalk or bone flour to the ration.

I am in entire agreement with Professor Linton in his plea for care in the administration of vitamin D. The work of Harris and Innes at this stage cannot be applied to the dairy cow. The assimilation of calcium and phosphorus by the ruminant cannot be assumed to

be the same as in the rabbit or rat and consequently the whole question of vitamin D in relation to the dairy cow will have to be examined. Hart and Steenbock could find no positive influence of improvement in calcium assimilation although vitamin D was proved to have been absorbed into the blood. Professor Linton does not mention what, to my mind, is the greatest danger of the free administration of cod-liver-oil as a source of vitamin D and that is the fact that many investigators have found that cod-liver-oil given in the ration seriously reduces the percentage of fat in the milk, whilst it has not been proved to have had any beneficial effect on calcium assimilation. If it is thought that an animal is not receiving a sufficiency of calcium in its winter's ration then this can be corrected by either giving a better quality hay, or else by the addition of a mineral supplement in the shape of chalk or bone flour, and this is surely a far safer method than resorting to the use of a substance such as vitamin D—which may be valueless to a dairy cow as far as we know at present.

The Chairman: The paper is now open for general discussion, but before proceeding I, as Chairman, would like to offer a few remarks.

The paper deals only with calcium and phosphorus and with dairy cows alone. I am afraid if I keep you to the point there will not be a great deal of discussion, for so few of us have actual experience of weighed amounts. Therefore I think a little latitude will have to be allowed. We might even consider the male, the growing animal, and minerals as long as they are chiefly calcium and phosphorus. My interest in dietetics is, of course, the equine side and of this the economical and substitutional aspects. I can, however, fully realise that milk production and reproduction is the cow's work and that she must be fed up to her optimum.

It seems to me that we have a long way to go before every herd is being treated on these lines. If every practitioner went carefully into these requirements and advised his clients accordingly there would be less digestive troubles, more milk and reduced costs. It would add to the veterinary surgeon's prestige and we should hear less of our profession having "missed the boat" in matters dietetic. I notice that the Committee recently formed to publish "Nutrition Abstracts and Reviews"—a much felt want—does not include a veterinary surgeon among its number although the avowed function of the body is the collection of data on the development in nutritional research and its application to human and veterinary medicine and animal husbandry.

Professor Linton demonstrates the wide differences in the scales proposed by Crichton and by Kellner. He wisely comes to no definite conclusions. As he says, "there are the effects of light, exercise, water supply, vitamins, etc., to be taken into consideration."

We know, too, that disease of the parathyroid glands often means hypocalcæmia, and that the injection of their extracts into the normal animal causes hypercalcæmia. It seems to me quite unsatisfactory to explain one case of milk fever in a herd of very similar animals, on the same diet and under apparently identical conditions, by saying it is hypercalcæmia and stopping at that. Surely there must be some other factor or factors at work? The process (call it evolution, selection or what you will) which has made certain cows give larger amounts of milk than their sisters, will surely have done the job thoroughly and not left out provision for the supply of calcium and phosphorus.

We hear chemists saying that they are accustomed to find a deficiency of lime in hay on which milk deficient in non-fatty solids has been produced. This seems to me to be wholly unjustified in view of what is expressed in Professor Linton's paper.

In view of the numerous factors exerting their influences on the physiology of animals simultaneously, it does appear extremely difficult to assess the value of one mineral in relation to others, or of all minerals in relation to other factors. The previously incalculable factors are gradually being brought under the "rule of three," thanks to workers such as Professor Linton.

One thing which seems to emerge clearly is the wonderful elasticity of the vital processes, and their adaptability to altered circumstances without visibly passing from physiological function to pathological disfunction. Apart from the diseased state the practitioner ought to study that field of variation within physiological limits, so as to determine the greatest efficiency. I doubt if practitioners can furnish Professor Linton to-day with much evidence other than that relating to disease conditions. We hear very extravagant claims in the control of many diseases of dairy cows, when they have had calcium and phosphorus in artificial forms added to their diets. Abortion, Johne's disease, tuberculosis, "Felon" (pseudo-rheumatism of milking cows) come to one's mind in this connection. At the present time there are numerous firms supplying the mineral wants of cattle. As far as I can see a great deal of the work, upon which their use is based, requires to be scientifically controlled. Often other causes such as light, ventilation, vitaminic diets, new methods, disinfection, alteration in virulence, epidemiological factors, and even a fresh cowman, all enter into the picture.

I, for instance, do not know whether it has been proved beyond dispute that rhododendrons growing in profusion indicate that the soil is too low in calcium content to maintain dairy cattle in a healthy state, and that therefore calcium deficiency in such cattle is an important factor in tuberculosis prevalency in that area. I suspect there are numerous other conditions at work and that many of these are comparatively easy of removal. Until proof is furnished loose statements do harm. Is excessive milk production an important factor in causing the prevalence of tuberculosis in cows? Tuberculosis is quite common in the human female, but I have never heard that it is getting less owing to lessened milk secretion.

Perhaps Professor Linton, in his reply, will indicate to what extent he thinks Ca and P deficiency is responsible for the prevalence of tuberculosis, abortion and like diseases, and what hopes can be held out for their control by correcting such deficiencies?

Captain W. Lyle Stewart (Newcastle) said that he thought their very best thanks were due to Professor Linton and to Dr. Stewart for so ably introducing that very fashionable subject to them that morning. Perhaps he should apologise for contributing to the discussion, since he was not a practitioner and because he felt that the answers to the questions propounded by Professor Linton

regarding the part played by calcium deficiency in producing bovine ills could best be supplied by practitioners. Chemical analysis, however valuable, could only take us so far and nothing could supplant the value of accurate observation. Certainly one must have a theory, but the theory must be quite elastic and altered to fit in with the observed facts.

Nowadays no one doubted the importance of the rôle played by calcium in the animal body; on the other hand, the tendency was perhaps to ascribe too much to it. We knew that it was concerned in the ossification of bone, the contraction of heart muscle, excitability of nerves, the clotting of blood and milk and in digestion and permeability. In other words, it was intimately concerned with a state of health. Also, the great store-house of calcium in the body was the bone, and bony tissues must not be regarded as stationary structures which underwent no change. They were constantly undergoing changes due to apposition and resorption corresponding to the needs of the organism and to their function as reservoirs of calcium and phosphorus.

Although the actual combinations in which calcium occurred in the body were not clearly known, we did know that the proportion of calcium in the blood was jealously maintained by solution from the reservoirs directly any event occurred which tended to deplete it. This resorption of calcium from the bones was aided by the secretion of the parathyroid glands, and it was well known that softening of the bones occurred as a result of over activity of the parathyroids.

If we applied this knowledge to dairy cows what should we expect to find in cases of calcium and phosphorus deficiency? One would probably expect debilitating disease of a chronic insidious nature, showing at first rarefying changes in the bones and later a low calcium content of the blood. The parathyroid glands might hypertrophy and extra secretion might be poured out in order to keep the blood calcium level normal. One would certainly expect such changes in preference to retention of the placenta, susceptibility to contagious abortion and sterility. But he admitted that that was theory and accordingly must give way to facts whenever those were presented.

From the figures quoted by Professor Linton, there appeared to be considerable disparity of opinion as to what proportions of Ca and P could, in various circumstances, be absorbed. Since the mode of action of vitamin D would seem to be to promote the absorption of Ca and P from the bowel, there might be a case made out for supplying vitamin D in some form or other to high yielding cows in order to avoid over-feeding with minerals or an excessive drain on the calcium reservoirs.

In conclusion, he would like to ask Professor Linton if he considered that cod-liver oil could with advantage be fed to dairy cows? Or, on the other hand, was its use contra-indicated?

Mr. Hugh Begg (Lanark) observed that he had only one question to ask, as one who had been interested in milk fever for the last 40 years. He was wondering whether the changes in agricultural practice had any direct bearing on the calcium deficiency diseases. He remembered, as a young boy, the amount of lime that was carted on to the land, particularly gas lime, in his native village. He would like to have these specialists in calcium deficiency tell them whether the land was losing its phosphorus content to the detriment of the crops, owing to the absence of the fertilizers commonly used in his young days.

Major W. F. Aston (Shrewsbury) said that, as the Chairman had called on him, he felt it his duty to try and respond. As a general practitioner he could only tackle the problem from the practitioner's point of view—that was, by the cases of milk fever which arose in the course of general practice. He was very interested in last year's happenings in his district. In one week he had 23 cases of milk fever and if he had remembered rightly, it was in the third or fourth week in July. One farmer had eight cases of milk fever in the week. The cows were out to grass. Surely there was some particular cause for this epidemic of milk fever which happened throughout last year. He only mentioned that one week because he counted all the cases that arose. He was interested in what Dr. Stewart said that apparently in July the calcium content of grass was higher than in the spring or autumn. Could they throw any light on the prevalence of milk fever in July last year? They had hilly districts as well as good lowlands, and he had never noticed any deficiency in the hilly districts. The prevalence of milk fever in the hilly districts was negligible and he could not remember ever treating a case of milk fever on any of the hill farms, so that one would think that the calcium content of the low land and hilly land did make a difference. He much appreciated the Chairman's remarks, but he confessed he was somewhat out of his depth.

Mr. K. D. Downham (Harper Adams Agricultural College) remarked that in Lancashire a number of farmers experienced outbreaks of what they called "slow fever." He imagined that this condition might possibly be due to some deficiency in the food. He thought it possible that the calcium and phosphorus content of the grasses might be a factor in connection with this disease. He had always thought there was a likelihood of calcium deficiency in the cow on account of the tremendous demand that was made on her system through constantly bearing calves, producing large quantities of milk, and the unnatural conditions of housing with the partial exclusion of sunlight, etc.

He had had blood calcium tests carried out from normal animals, together with animals which had reacted to the "Johnin" tests, and it was found that there was very little variation in the calcium content of these bloods.

As far as he could see, it was necessary to get back to more natural conditions for the dairy cow; he thought that any deficiency that might now occur would then be largely rectified.

Mr. R. E. Montgomery (London) said he would apologise to the lecturer and the opener of the discussion for having missed the earlier debate, as that possibly was the keynote of the discussion. His own experience of deficiencies was limited to animals in the Colonies, where they constituted definite disease conditions and also accounted for much malnutrition and intercurrent indisposition.

One point in particular occurred to him as being worthy of investigation—namely, the relation between the calcium and phosphatic content of grass or soil as disclosed by

analysis, and the amount necessary for an animal's well-being. A certain standard had come to be accepted; in one Colony, British Guiana, recently visited, both soil and grass showed a definite deficiency when compared with this standard, and the cattle showed a marked craving for bones. Despite these evidences the animals were in good condition and appeared to subsist normally upon the pasture.

Here, then, was an example where the laboratory investigations would discourage stock raising, while field experience indicated that the deficiency was not serious.

Was the mineral requirement less than had previously been supposed? Or was it the form available?—for he wondered whether the cattle of East Anglia might not benefit from a ration of bone meal, as did those of those Colonies where deficiency had now been proved.

Major T. G. Heatley (Woodbridge) said he would like to try and give an explanation as to why they got a rush of milk fever cases at certain times of the year. He expected to get a lot of milk fever cases when they had had several days of very wet weather, succeeded by a spell of hot weather. The only explanation he could give was that there was a sudden flush of grass. Also, why was it we seldom saw milk fever in a cow until she had had her third calf? If Professor Linton could suggest any reason they would be glad.

Captain D. Campbell (Rutherglen) observed that he really had to confess to abysmal ignorance of this question of nutrition, and he would not venture to give any views on the matter. He would relate an instance which occurred a few months ago in his area, and had all the appearance of the symptoms which they now associated with calcium deficiency. A client of his had his herd of 50 dairy cows poisoned with arsenic. By a misadventure these cows had with their evening feed a quantity of "Paris Green," which largely consisted of arsenic, and the following morning every cow was showing fairly obvious symptoms of poisoning—in 10 days 18 cows had died. What particularly struck him was the large number which had showed symptoms which were indistinguishable from those of milk fever: not more than 5 out of 30 failed to show these symptoms at one stage or another. The symptoms began with the straightening of the hocks and staggering, which one always regarded as connected with milk fever, and the usual train of milk fever symptoms followed. Inflation of the udder caused these symptoms to disappear in a few hours, though they were apt to recur.

If the symptoms were specially severe he injected calcium gluconate as well, and in all fourteen cows received the gluconate.

As to the number of udder inflations he could not say. He did not profess to know anything whatever about the matter of calcium deficiency, but it struck him as astonishing, apart from what they did know about milk fever, that here was a series of cases of straightforward arsenical poisoning and practically every cow at one stage or another showed the symptoms which we relate to calcium deficiency.

Lieut.-Colonel H. G. Bowes (Leeds) said there was just a point which did not appear to be covered by the paper, but which he thought had an important bearing on the subject.

A few moorland farms in Yorkshire the winter before last were experimented on to see if they could get some information on the point as to whether there was some association between calcium deficiency and the incidence of the disease which they called tremblings. From these farms samples of the grasses were taken and analyses were made by the chemists, and in some instances a distinct mineral deficiency was found, so that it did seem that there might be something in regard to the grass feed. Another point the experiment brought out was that the average weight at birth of the single lambs which were mineral fed, was about 1 lb. more than that of the controls and the twins about ½ lb. more. These were all moorland sheep and the lambs varied in weight from 6 to 11 lb. at birth, so they did appear to get some benefit from the mineral treatment. They got a certain amount of valuable information, although the experiment did not throw much light on the cause of "tremblings." The minerals were fed to the ewes on the moors in the form of mineral pellets, which were really small cakelets made up of certain meals with the minerals incorporated in them. The ewes were gathered and the pellets given to them either on the ground or in troughs.

Captain J. R. Hewer (Swindon) thanked the author for his paper, which he was sure was very interesting to practitioners. He would mention particularly two farms, one on the chalk hills and the other lowland. Until recent years he hardly had a case of milk fever on this high land farm, but when they started steaming up the cows and feeding them on balanced rations, they began to get milk fever. Those cows were fed on a proprietary cake which was balanced. Also on the same farm they got a number of sheep which were affected at lambing time with a condition similar to milk fever which responded quite readily to inflation, provided the case was treated early.

The other farm was a farm in the valley, and that farm did not get milk fever cases until the cows were fed on balanced rations also. These cows were fed scientifically, and this dairy had produced several 2,000-gallon cows.

Mr. F. C. Scott (Pontefract) stated that he would like to relate one experience which happened two years ago. During that summer in his district it was rather dry—the grass was scarce and potatoes were plentiful; throughout that period the farmers were in the habit of feeding the young stock with potatoes. Subsequently they had an enormous number of cases of rickets in calves about six months old. He thought that rather significant, because potatoes were short of calcium and because in other years, when there was plenty of grass, they did not get any rickets.

Another point which interested him was the use of cod-liver-oil. They generally found that if the butter fat was getting low in a dairy, they would recommend cod-liver-oil; that was apparently a fallacy according to Dr. Stewart, and would come as a surprise to many people who were satisfied with it.

Professor W. M. Mitchell (Edinburgh) said that with regard to the remarks of one or two speakers as to the use of cod-liver-oil, he would relate an experience in a certain flock of sheep where a number of cases of rickets had occurred in lambs and he had suggested that pregnant ewes should be treated with the oil. This year starting

in January he got the owner to give the pregnant ewes to the number of 27 score, two teaspoonfuls of cod-liver-oil per day per head mixed with the box feeding—unfortunately from the point of view of a true experiment no controls were kept.

It was found that when the ewes lambed they were in better condition, the lambs were stronger, only three cases of joint-ill occurred and no cases of rickets.

He knew that farms around had a considerable amount of joint-ill and it seemed to him that cod-liver-oil went a long way towards solving the question of calcium assimilation and also in preventing infections about the time of birth.

He expressed the opinion that there was not really a deficiency of calcium in the diet of horses in this country but that the pathological changes so common in horses were associated with some factor which caused interference with the deposit of calcium or the maintenance of calcium in the bones.

The bacteriologist had had a good run in the last 50 years but was now more or less at the end of his tether and he had little doubt that each succeeding congress would more and more be involved in discussions on the relationship of diet and disease; it was of great importance that those who were really interested in the chemistry of foods should keep in close touch with the clinician and *vice versa.*

The importance of sunlight as the source of vitamins was noticeable in the stunted growth of natural foods, and in the same way human beings and animals improved in health in sunlight, but in many cases animals were kept housed winter and summer in buildings badly lit and often worse ventilated. He could not help thinking that although they had housing schemes for human beings they needed them also for animals, particularly for horses.

The Reply.

Professor R. G. Linton (Edinburgh), replying to the discussion, said that when he set out to write this paper he did so for the purpose of raising a discussion concerning the mineral requirements of dairy cows, and hoped to gather some information from practitioners regarding the alleged calcium deficiency of bovines. He was rather disappointed in the evidence brought forward. It had become fashionable to talk about calcium deficiency and vitamin requirements of cattle, but he thought we really knew very little about the matter, and it appeared to him that we were going a little bit too fast in supplying minerals with the foods when in fact we did not know the actual requirements.

Dr. Stewart agreed with him (the speaker) in the main, and they were in agreement in believing that the assumption that cows only assimilate 20 per cent. of the food calcium, was too low. If it was correct, he (Dr. Linton) could not conceive what the cows had done in past years before the practice of supplying them with additional calcium was begun. He was inclined to think that Kelner's standard for calcium and phosphorus requirements was more nearly correct than the former estimate.

One wondered, did the calcium in good pasture grass really represent the requirement of dairy cows? This was important, because many people were basing the winter requirements on the amount of calcium that a cow was taking in on "good" pasture. He was not at all sure if that was right, and he thought it was probably more correct to assume that cultivated pasture grass contained more calcium than the animal needed. He had in mind a herd of 300 cows in Shanghai which was kept housed and fed artificially. At the present time they were trying to determine what should be the amount of minerals supplied in the food, and in this connection the question had been raised as to whether one should take good British pasture grass as an index. The question was a very important, and at the same time a very difficult one.

Dr. Stewart had said that the figures for hay calcium content which he (Dr. Linton) had laid before the Conference were rather low. That was true, but as was stated in the paper, many of the samples were local Italian rye grass hay which he had found particularly low in calcium. Dr. Stewart had asked if the hays analysed were all from samples that had been fed to dairy cows. The answer was no, not all of them.

When considering mineral requirements one must not forget the cow is not a machine—she is an animal with remarkable powers of adaptability—and he thought it rather a risky business to lay down a "standard" of calcium requirements. He agreed with Dr. Stewart that where good hay was supplied it was probably true that no extra minerals were required in the food, and he looked upon good hay as one of the most valuable foods that could be given to a dairy cow in the winter.

A question had been raised regarding the administration of cod-liver-oil to dairy cows, and its effect upon the butter fat. In his opinion, it had been proved that the addition of this oil to the food did tend to reduce the percentage of butter fat in the milk. It was, moreover, doubtful if cod-liver-oil caused an increase in the assimilation of food calcium when given to cows.

As was to be expected, milk fever had been mentioned many times by those taking part in the discussion, but no evidence had been brought forward that nutrition had anything to do with milk fever as far as calcium was concerned. Nobody at the Conference had suggested that the incidence of milk fever could be reduced by the addition of calcium to the diet.

There were instances where the addition of calcium to the diet of cows produced larger calves, and the important point was whether these were abnormally large animals or really represented the normal; in other words, did the addition of minerals supply a previous deficiency? This was an important matter and required careful consideration. He did not think that there was any evidence at all that the cows in this country suffered from a mineral deficiency.

Major Aston had referred to the practitioners' point of view, he (Dr. Linton) said that, of course, laboratory work was absolutely sterile if the workers were not brought into contact with the practitioners. They both needed and wanted their help and that was surely one of the objects of the Conference.

Reference had been made to the increase in the incidence of milk fever in July; he could offer no suggestions as to why this should be so.

In reply to Mr. Eustace Montgomery's remarks concerning mineral deficiencies in the Colonies, he was in agreement with him that nutrition played an important part in the prevention of disease,

Major Heatley had asked why milk fever was more common at the third calving. It had been suggested that this was the result of an increasing depletion of calcium from the body culminating in an attack of milk fever. He (Dr. Linton) did not think there was anything in support of this contention.

Reference had also been made to the increased incidence of milk fever when cows were "steamed up" before calving. He did not like this system of feeding if it meant a severe reduction in the quantity of hay.

The Chairman, at the conclusion of Professor Linton's reply, said that, on behalf of the Association, he thanked Professor Linton, Dr. Stewart and all who had taken part in that interesting discussion. He personally agreed with the remarks of Professor Mitchell that dietetics should play an important part in every practitioner's methods. If they could only give advice to the farmers in that respect, he thought it would help the profession and the farmers to a very great extent. Liverpool was an outstanding example in that connection, for there were over 5,000 cows housed in the city and the cowkeepers fed their cows on the very best hay that could be procured—they paid £5 10s. 0d. a ton for it and insisted on the best.

The discussion had been most interesting and he proposed a hearty vote of thanks.

Major Rabagliati (Wakefield) observed that it gave him great pleasure to second the vote of thanks. The subject, as had been said, was one of ever-increasing importance to the profession, and he had every pleasure in seconding that resolution.

The vote of thanks was accorded with acclamation.

No. 2.- Milk Hygiene.

By

J. McAllan, M.A., B.Sc., M.R.C.V.S., and G. Howie, F.R.C.V.S.

(Continued from page 995.)

The Replies.

Captain J. McAllan (Aberdeen), in replying, said that in spite of the very interesting discussion, his reply would be brief. He would like to say at the very beginning that he was disappointed that some of the speakers, at any rate, were so emphatic as to the scare that might be raised by the paper. When they brought up the subject of diseases due to milk, he thought they had explained fully why they had done so. They did not bring the cases up with the intention of pointing out that public health officials were missing these cases of infection. The importance of the paper was that it had brought these cases forward, and they thought it was well worth while doing so. Especially would he emphasise this with regard to the cases of undulant fever which had occurred in the North of Scotland.

Mr. Begg surely did not imagine that they were, at that time of the day, blaming the cow for being a diphtheria carrier. The case quoted was simply brought up as one which was worth looking into. Although in that case the cow was culpable, they did not hold her entirely responsible for the outbreak. With regard to undulant fever, the writers were of opinion that many cases of indefinite illness in the human being might turn out to be cases of undulant fever.

He thought other speakers dealt chiefly with the very vexed question of pasteurisation and when the paper was written he was sure that it would lead, and pleased to see that it had led, to controversy. It was with great reluctance that they put in their recommendation with regard to pasteurisation. In any defence of pasteurisation, he would, however, emphasise that very important word "efficient." The City of Glasgow had sent out only this month to the larger local authorities in Scotland a memorandum asking them to consider the question of asking for statutory powers with regard to the pasteurisation of all ungraded milks. That was no mean support to their recommendation!

He would like to thank Mr. Bosworth for his remarks, especially for his support in recognising why those diseases due to milk were well worth bringing forward. Mr. Bosworth had criticised the diagnosis of the cases of undulant fever found in our City Hospital Laboratory, but he would point out that those diagnoses were made not merely on serological tests but were confirmed by the cultural methods; so that there was no doubt about their being definite cases of undulant fever.

He offered his personal thanks for the very fine discussion that had taken place.

Captain G. Howie, also replying, said he did not think there was much for him to say. He thanked them for so ably discussing what they had put forward; he thought they had really been let down very lightly.

He had to agree with what most of the speakers said regarding tuberculosis, and certainly with regard to the taking of samples. In his opinion, it did not matter at what stage of the milking they were taken; whether at the beginning, the middle, or at the stripping. They would get the same result at any time. He was glad, but surprised to know, that there were some inspectors present who could, without difficulty, always find the tuberculous udder. He confessed that he had not found it so easy. In fact, he had frequently found it extremely difficult to find the cow on the first visit. He had certainly had more trouble during the last few months in finding the tuberculous udder at the first visit as the result of the intensive sampling in the City and the following up of positive samples found as the result of guinea-pig inoculation in cases where disease did not appear in these animals till the eighth week. He maintained, however, that there were no definite clinical symptoms in a tuberculous mastitis and his difficulty had been to know when to take samples and when to disregard some small and apparently slight abnormality in an udder.

Efficient pasteurisation of milk could always be carried out in most of our cities but the milk consumers in country districts can obtain no such protection. The only way to safeguard their milk supply was very efficient and frequent inspection of all milk cows and dairies.

In the investigation and control of such diseases as they had brought forward, the closest co-operation between all officials of a Health Department was necessary. As Mr. Bosworth had pointed out, it was only by such close

co-operation that outbreaks such as had been described could be efficiently dealt with and thoroughly investigated to be of real scientific interest.

Vampire Bats and a New Disease.

From Port of Spain *The Times* Correspondent writes to his paper on September 4th:—"A disease, which is causing many deaths among both human beings and animals, is prevailing in Trinidad, and is perplexing medical and veterinary practitioners. The symptoms of the disease in human beings are similar to those of infantile paralysis. In animals the disease was first diagnosed as botulism by the United States experts, Drs. Jacobi and Graham, but the results of experiments now suggest that the virus is similar to that of the disease in humans. Death occurs in four or five days following the onset of the disease, but a prolonged period of incubation is suspected.

"A conflict of views among scientists is revealed by contradictory reports of specimen tests at the Lister Institute, London, and the Rockefeller Institute, New York. Sir Wilfred Beveridge declares that the problem is unusually difficult and probably new to science. He suggests that the virus is carried by some biting animals, and recently Dr. Wise, Surgeon-General of Trinidad, declared that the reports received suggested that the disease was carried by vampire bats, which abound locally. According to news from Brazil an outbreak of rabies there among the bats has caused 30 per cent. of the deaths of cattle. The disease has been noticeable in the colony since 1925, but the objection was raised that no mad bats had been seen flying in the daytime. No danger, however, threatens visitors to the colony provided ordinary precautions are taken, as the disease is confined to the country districts."

Britain's Only Wild Cattle.—The Chillingham herd of wild cattle, the only surviving herd living in a wild state in this country, may be destroyed. The Earl of Chillingham, who is closing down the castle on account of heavy taxation, states that there are 48 beasts, and they cost, approximately, £8 to £10 a head per annum.

Handling the Stump in Supravaginal Hysterectomy in Dogs.

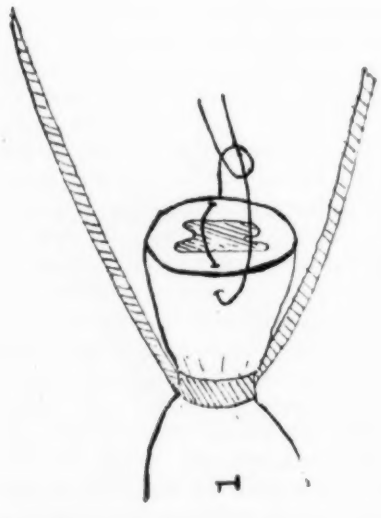
By
R. H. Smythe, M.R.C.V.S., Camborne.

The handling of the stump in abdominal hysterectomy of the bitch usually determines the issue, and the article by L. A. Merillat reproduced in the *Veterinary Record* of August 29th justly directs attention to the importance of suitable technique. Few veterinarians appear to have given the subject special attention; the majority depend upon simple ligation and have ceased to regard a fatal issue with feelings of disappointment.

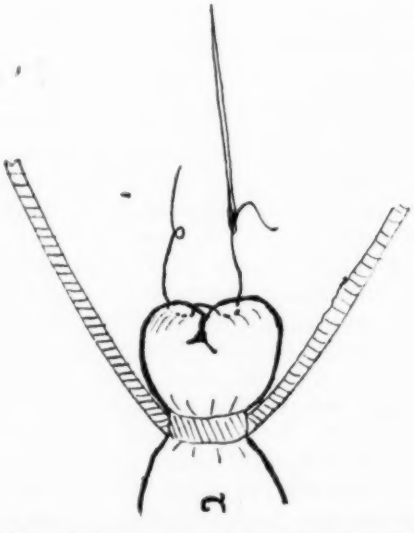
In dystocia and in pyometra the method is seldom successful; in spaying the non-pregnant female it is quite satisfactory, sometimes even unnecessary. In both the former cases, the stump is markedly enlarged; its calibre is proportionately great and its lumen comparatively small. Invagination is by no means a simple matter owing to the thickness of the walls and the narrowness of the canal. The best hope of invagination lies in incision at the cornual bifurcation and withdrawal of the whole mass through the cervix and out of the vagina. Suturing of the serous surfaces at the anterior end and ligation as far forward as possible, at the vulval end may save the patient's life, but the procedure is bad surgery, as it constitutes an incomplete operation, followed by a great deal of discomfort if not by actual suffering.

The fact that the post-cervical stump is more or less inaccessible, within the pelvis, renders operative procedure comparatively difficult. However tightly applied around the swollen stump, the simple ligature invariably becomes loose through shrinkage of the mass after 12 hours and can be found free within the abdominal cavity when the *post-mortem* examination is carried out on the third day after operation.

If inserted through the serous coat, at intervals, after



Diagrammatic representation of stump, showing constricting suture in position and ready for tying.



Constricting suture tied and commencement of suturing by Lembert's method.

Finished stump.

the manner of a purse-string, the ligature remains *in situ* but becomes loose and comparatively useless. Oozing of septic material into the peritoneal cavity takes place, not only from the vaginal canal but also from the cut ends of the walls.

Transfixing the stump provides a path for infection; peritonisation offers a surgical method, commonly adopted in human practice, but the technique is difficult in the smaller animals. In its simplest form, it consists in encircling the unsutured stump with broad ligament or in inserting it within the vesicular fold.

The method adopted by the writer is somewhat different, but being quite simple it gives consistently good results.

In hysterectomy, intended for the removal of the fœtus, a long abdominal incision is advantageous and is amply compensated for by the ease with which the distended horns can be removed. It can safely be extended backwards to the pubic brim. A ligature is applied around the vagina as close to the vulva as possible and the ends are brought through the incision so that traction can be applied and the hinder part of the vagina brought within easy reach.

A second ligature is applied around the cervix. A pad of boiled cotton wool is wrung out and placed beneath the site of the intended incision, in order to absorb any septic material which may escape. The vagina is next divided immediately behind the cervix and between the two ligatures. The stump is painted outside and inside with tincture of iodine.

After removal of the pad of wool, suturing of the stump is proceeded with. This is carried out in two stages.

Firstly, a constricting suture is inserted and its nature is indicated in Fig. 1.

The silk thread is carried laterally through the stump, penetrating the serous coat half an inch from the cut extremity and emerging through the muscular layer, midway between the serous covering and the mucous lining. Passing across the vaginal lumen, it is inserted in a similar manner through the muscular and then through the serous layers of the opposite wall. When this suture is drawn tight and firmly tied, the lateral serous surfaces are brought into apposition, whilst the upper and lower surfaces automatically approximate themselves. Hæmorrhage is satisfactorily controlled by the pressure upon the uterine vessels, thus created. The upper and lower edges are now united by either an interrupted or continuous Lembert's suture, including the serous and muscular layers only, and the vaginal ligature is removed. This method ensures complete closure of the stump with rapid union of the serous surfaces.

Official figures show that the slaughterings in 1930-31 of livestock were smaller than in the previous 12 months. The total production of all kinds of dressed meat was nearly one million hundredweight, or 6 per cent., less than in 1929-30, and almost two-and-a-half million hundredweight (14 per cent.) below the heavy total recorded in 1928-29.

The following are the estimated numbers (subject to revision) of animals sold for slaughter off farms in England and Wales:—

Year, June to May.	Cattle.	Calves.	Sheep and Lambs.	Pigs.
	000	000	000	000
Average, 1924-29	1,326	879	6,473	3,790
1929-30	1,410	933	6,607	3,244
1930-31	1,322	808	5,868	3,219

Clinical and Case Reports.

"Chilian Peas."

By

G. W. Clough.

Mr. D. J. Anthony, in his paper entitled: "Some Common Diseases of Pigs," read at the Norwich Congress, referred to some cases of poisoning of young pigs as the result of feeding with Chilian peas. In the discussion, Mr. Jackson Young stated that there were 40 varieties of Chilian peas, and asked for the name of the variety in question; he also asked how the analyst found a glucoside in the stomach (*Record*, this vol., p. 978).

It may be of interest to give a few details concerning this case. About 80 pigs (age five to six months, weight 100-140 lbs.) were fed with a mixture containing 12½ per cent. of a food described as "Chilian Peas" which had been purchased a few days previously. A number of the animals became ill and nine died suddenly. The *post-mortem* examination revealed some gastritis and patchy enteritis. The stomach and bowels of one pig that was slaughtered were submitted for analysis and a specimen of the peas was also received for examination. No poisonous substance was detected in the animal's viscera. The peas on incubation with water yielded 0·018 per cent. of hydrocyanic acid, that is to say, 1¼ grains per pound; the conclusion was drawn that this was probably the cause of the damage.

In order to identify the seeds, some which had been taken from the sample were grown at Kew Gardens and from an examination of the plants raised it appeared that the sample consisted mainly of forms of the Common Vetch (*vicia sativa*) and the Purple Vetch (*vicia atropurpurea*).

The seeds had come from Chili (South America) and were screenings of Chilian barley. The seeds of the Common Vetch are stated by Pammel to be injurious to pigs (*Manual of Poisonous Plants*, p. 120). Two glucosides are present in *vicia sativa*; one is a cyanogenetic glucoside vicianin and the other is vicine, which on hydrolysis yields divicine, an oxy-amino derivative of pyramidine. It may be recalled that Anderson, Howard and Simonsen (*Indian Journ. Med. Research*, 1925, **12**, 613) have expressed the view (which is not shared by the present writer) that lathyrism is not due to the seeds of *lathyrus sativus*, but that it it caused by seeds of *vicia sativa*, which are frequently found in the former vetch.

Foot-and-Mouth Disease in Nigeria.

By

W. G. Beaton, M.R.C.V.S.

Research Officer, Veterinary Laboratory, Nigeria.

Owing to the policy of slaughtering all infected and in-contact animals as soon as an outbreak of foot-and-mouth disease is confirmed in Great Britain, the drastic effects of this disease in a herd when the condition is allowed to continue are now liable to be forgotten by the younger generation in the profession. It is as well that they should be reminded, therefore, by an account of an outbreak of this disease which was allowed to continue uncontrolled—

and thus add conviction to their beliefs when replying to the layman's continual questioning of the slaughter policy.

In a herd of 200 bulls attached to this laboratory for rinderpest antiserum production, an outbreak of foot-and-mouth disease occurred a few days after the introduction of one of the weekly batches of new animals, all of which appeared perfectly normal at the time. Within three weeks 75 per cent. of the herd had become infected, the remainder not contracting the disease or doing so very mildly and being undetected.

Symptoms.—Salivation was profuse (the continual movement of jaws and tongue working this up into thick froth), followed by ulceration of the lips and tongue, the animals being unable to feed. Fever of varying intensity was present. There was a rapid loss in condition, verified at first by the routine weekly weighings of all serum producers and later becoming obvious.

Ulceration of the coronet of the hoofs and between the claws caused considerable lameness and the animals presented an abject appearance, being hardly able to move. In one or two instances a claw was shed.

Later the mouth lesions improved and the animals were able to feed from troughs of boiled cotton seed and chaff placed in front of them. The foot lesions resulted in lameness for months and months and even now, some nine months after the commencement of the outbreak, a distinct mark can be detected in the horn where the old and new tissue join.

Pigs, sheep and goats, while not in actual contact, were in close proximity with frequent interchange of native labour, yet in only one case of a sheep was the condition definitely seen. Artificially, two sheep were infected by the inoculation of virulent blood from a bull.

Many of the above animals lost so much condition that their keep was unprofitable, as they could not be used for breeding purposes, and these were disposed of at very low prices. The others only regained condition after a considerable time on a heavy ration of artificial foodstuff.

Later, the disease affected a herd of breeding cows, resulting in numerous abortions and the loss of many sucking calves. As those cows were not being milked, the actual reduction of milk was not noticed, but the deaths of the calves must have been aided by this factor. In the calves stomatitis and a gastro-enteritis of varying intensity were the lesions seen.

The loss of condition of the adult cows was very noticeable and many yet have not recovered from the effects, while several obscure deaths could probably be attributed to the complication of foot-and-mouth disease.

In East and West Africa foot-and-mouth disease is usually looked upon as a benign infection, but there was no doubt of the extreme virulence of this particular outbreak.

Urinary Calculus in a Horse.

By

R. M. Smith, M.R.C.V.S., Galston.

Subject.—Clydesdale gelding, ten years old.

History.—Castrated as a two year old, and since then there has been incontinence of the urine. The condition became gradually worse and not until two years ago was treatment adopted, which consisted chiefly of urinary sedatives.

The horse remained at work and in fair condition until two weeks ago when he stopped feeding and micturated almost continuously. The catheter was passed and a calculus located in the bladder. He ate practically nothing for a week and was found dead in his stall.

Post-mortem examination revealed a calculus which completely filled the bladder and which weighed 8½ lb.

Review.

[**Diseases of the Feet in Cattle.** By the late Professor E. Hess. Third, completely revised, Edition edited by Professor E. Wyssmann, with 161 illustrations in the text and one Coloured Plate. 8vo. 255 pages. Published by Urban & Schwarzenberg, Berlin and Vienna, at RM 18, paper-covered, RM 20-40 bound.]

An authoritative work on the subject, complete to the last detail. As compared with the 2nd Edition, published in 1913 as Vol. IV, Part 3 of the Handbook of Veterinary Surgery and Obstetrics, 60 illustrations have been deleted as obsolete and 18 new ones inserted. The illustrations as they stand are entirely apposite and form a most valuable feature.

The first three chapters deal minutely with the anatomy of the feet, the various forms of the fore and hind feet, care of the feet. The last-named includes promotion of growth, attention to shape and soundness and descriptions of various devices for trimming the claws.

Chapter 4 describes and shows in detail means of restraint. These include the holding up of a fore or hind limb, the application of a twitch, the use of stocks of different patterns, casting and hobbling and the administration of anæsthetics.

The next three chapters enumerate shortly diseases, inflammations and operations with respect to the feet in general.

Chapter 8, which deals with diseases of the feet in particular, is the longest and most important in the book and is divided into eight sections. Of these, No. 5 devotes 102 pages to "Suppurative Conditions of the Feet," under which heading are described, with a wealth of detail and illustration, every conceivable form of abscess, ulcer, necrosis, panaritium, pododermatitis and sequel to foot-and-mouth disease as affecting the feet of the Domestic Artiodactyla. The remaining sections describe meticulously contusions of the sole and heels, laminitis, injuries to the soft tissues, sprains, fractures, tuberculosis, picked-up foreign bodies, arthritis, sloughing of the hoof, neoplasms and deformities, together with appropriate treatment.

Amongst other remedial measures well discussed are amputation of the claws, exarticulation through the horn or skin, and resection of the claws.

A census of pigs taken in Denmark on July 15th shows a total of 5,473,000, an increase of 292,000 since January and of 601,000 or 12 per cent. since corresponding date in 1930. The total is more than double that recorded in 1925. All classes of pigs show an increase. Breeding sows number 51,000 more than a year ago, and boars of four months old or over show an increase of 7,000 in the year.

Abstracts.

[**The Control of Foot-and-mouth Disease by Simultaneous Inoculation in Lombardy.** Comminotti. *D.T.W.* No. 32. p. 497.]

In 1928 an epizootic of foot-and-mouth disease raged in the provinces of Mailand, Brescia, Cremona and Bergamo, and an opportunity was presented of carrying out extensive tests of the Loeffler-Waldemann and Schleissheim methods of prevention. The former consists in the simultaneous inoculation of immune serum and virus, while in the latter method, blood from convalescent cases is used instead of serum. The following technique was adopted. Temperatures of all animals in the stables were taken and all cattle showing high temperatures or clinical signs of foot-and-mouth were excluded from treatment. Hyperimmune serum at the rate of 30 c.cs. per two-hundredweight liveweight was injected into the neck region. Virus was obtained from the mouths of animals showing vesicles, placed in salt solution and glycerine and transferred by means of scarifying the gums with Waldemann's lancette. When the supply of serum was exhausted blood from recovered cases was used. The blood from a number of recovered animals should be mixed. It is treated with sodium citrate solution and salt solution containing glycerine and carbolic acid is added. At a low temperature this remains fluid and preserves its antibody content for six months.

The author concludes that this simultaneous method, properly applied, constitutes an effective preventive against foot-and-mouth disease. In the malignant type a fatal result is prevented, while in the mild form emaciation, loss of milk and sequelæ, such as asthma and shedding of the hoofs, are obviated. On account of the risk of cardiac asthma following the injection of serum or blood when the disease is in its septicæmic stage, the author recommends that they should be bled 10-15 days later. Finally, animals treated while at grass should receive larger doses.

W. L. S.

[**Pigeons as Carriers of B. enteriditis breslaviense.** Schutt. *D.T.W.* No. 26. p. 401.]

In 1930 the number of cases of breslau infections dealt with at the Hygiene Institute, Veterinary School, Hanover, had risen threefold in one year, so in order to shed light on the question whether clinically healthy pigeons might be carriers and spreaders of the disease, a large number of such birds were examined. Agglutination tests of the blood from 120 apparently healthy pigeons showed eight with a significant breslaviense titre. The fæces were then examined bacteriologically and in five of these cases *B. enteriditis breslaviense* was obtained in almost pure culture, showing that these birds were active spreaders of the infection. Two eggs laid by one of the reactors were examined, but the micro-organism was not detected. On *post-mortem* the spleens, livers and intestines of the reactors were slightly swollen and the liver frequently showed small greyish-white nodules. The micro-organism was recovered from the heart, liver, spleen, kidneys and intestines of seven cases. Control measures in breslau infection consist of attention to general hygiene and the destruction of infected animals. Infected carriers can best be detected by the agglutination test and a reaction in 1·50 is regarded as a positive titre.

W. L. S.

[**Something Old and New about Blackhead.** Ullrich, Dr. *Prager Archiv. f. Tiermed.* 1931. Vol. 11. No. 5.]

In this paper the author publishes what he believes to be the first record of blackhead in Czechoslovakia. He diagnosed it in the turkey and also in the capercailzie in 1930 by *post-mortem* examination. He gives a detailed account of the disease and a critical review of the numerous opinions advanced from time to time as regards the etiology. Even now the identity of the causal micro-organism is not certain, beyond the fact that it is a protozoan. Ullrich made a careful study of the pathological histology of blackhead and he gives a detailed account of his findings in the liver and cæca. The differential diagnosis and the significance of Heterakis worms are also dealt with and a reference list is appended.

J. T. E.

[**Variations in the Colour and Structure of the Pancreatic Lymph Glands of Cattle.** Messner and Penitschka, Drs. *Prager Archiv. f. Tiermed.* 1931. Vol. 11. No. 4.]

The authors examined the lymph glands of the pancreas in 246 adult cattle killed for meat and found that 94 per cent. of them only had white pancreatic lymph glands, and of the remainder half had reddish glands and half had both white and red glands. Similar observations were made with 193 calves examined.

On microscopic examination it was seen that this variation in colour of the glands was associated with their structural arrangement, those of a red shade containing a stronger framework of interstitial tissue (trabeculæ) and a well developed capsule. The white glands had a much weaker framework and capsule. It was not clear how or whether the stronger framework was responsible for the reddish colour of the glands which possessed it. These red glands were not actual hæmolymph glands.

J. T. E.

[**Bacteriological Examinations of the Market Milk of Prague.** Galperin, I. *Prager Archiv. f. Tiermed.* 1931. Vol. 11. No. 6.]

In tests previously carried out it had been found that about 40 per cent. of the Prague milk supply was either watered or otherwise adulterated, and that only a small minority of milk retailers possessed cold storage facilities.

The author made bacteriological examinations of ordinary and pasteurised milk. Guinea-pig inoculations were used for the diagnosis of tuberculosis and Brucella infection; the count of coliform bacilli, *B. lactis ærogenes* and cocci was made by plate cultures; the milk was centrifuged and the sediment examined for dirt and leucocytes.

The results are illustrated in tabular form and the main results went to show that pasteurisation has a great antibacterial power. All pasteurised samples were free from pathogenic bacteria and only contained one or two million of other organisms per c.c., but all the non-pasteurised

milk had a high bacterial content including *B. coli*. This was evidently due to the fact that most dairy farmers do not cool their milk before sending it away.

In no case were tubercle bacilli or *B. abortus* found in either the raw or pasteurised milk out of the 46 samples examined.

J. T. E.

Public Health Report.

Report of the Medical Officer of Health of the City of London for 1930.

Reports by medical officers of health are generally of interest only to public health officials and mayhap to a small proportion of the population of the communities served by them. That is not always the fault of the reports.

We have before us the Report of the Medical Officer of Health of the City of London, and after a perusal of it we feel that here, at any rate, is a report that should be of interest to most people. It teems with information most accessibly set forth.

No part of the report could have a wider appeal than that dealing with meat inspection, prepared by the Veterinary Officer of the City, Lieut.-Colonel T. Dunlop Young. In great part it is statistical, but the statistics are drawn up so carefully and concisely that—for statistics—they are unusually interesting. What London lives on, how much it takes to keep it going, and from what sources it gets all its food, interest us all.

According to the Board of Trade returns, we are told that for the year ending December 31st, 1930, of beef, mutton, pork and bacon, there were imported respectively 11,616,903, 6,405,848, 641,207, and 9,189,757 cwts. The figures are staggering, and on contemplation we can but imagine the tremendous machinery that is needed in all parts of the world to control such a meat supply and the great responsibility that rests on London's own officials to check and inspect even a proportion of these imports, so that even a measure of safety in what it eats is guaranteed to the public. Of the quantity of beef imported, 78 per cent. was chilled and 21 per cent. frozen. Seventy-two per cent. of the total was sent by Argentina. Of the total of mutton and lamb it is interesting to read that over 50 per cent. of it came from New Zealand, whilst of bacon Denmark sent 66 per cent.

A table giving the source and volume of supplies to London central markets for 1930 and 1929 is interesting in showing the many sources of supply and the ratio per cent. from each country. For 1930, Argentina has a ratio per cent. of 43·5, New Zealand coming next with 16·5, and then England and Wales with 14·8. The figures are practically the same for 1929.

A table is given showing the amounts of home-killed meat seized at Smithfield on account of disease and the nature of the disease. Comparison with 1929 seizures reveals a decrease in practically all classes of animals and in all diseases, *e.g.*, in 1930 only 761 carcasses of pork were seized for all causes, as against 1,273 in 1929. It is interesting to read that owing to the official system of inspection and certification of all meat *intended for export* adopted by the Irish Free State, a considerable improvement in the class and in the handling of such meat has resulted. The hope is expressed that like good results will obtain when the North of Ireland Government brings into operation a similar system in 1931.

It is gratifying to find it recorded in the report that there has been a big decrease in the seizures of Argentina meat. This decrease is attributed to the representations made with regard to caseous lymphadenitis and the figures fully support this—7,097 carcasses seized in 1929, as against 918 in 1930.

The same has been the experience in Australian mutton with regard to caseous lymphadenitis, the figures being 2,543 carcasses in 1929 as against only 222 in 1930.

A table is given showing the seizures for caseous lymphadenitis alone for all countries and the claim that the extra work involved in the inspection for this disease in the city has led to improvement in the exporting countries is justified by the figures. In 1929, 12,976 carcasses were seized as against 1,832 in 1930—a remarkable decline.

Leadenhall Market and City Shops.

A total of over 35 tons was seized as against 21 tons in 1929. The enumeration is interesting for its very variety. Cold storage seizures show a big decrease for the year compared with 1929—284 tons as against 61.

Tables are given showing the amounts of various food products surrendered to or seized by Meat Inspectors in the City for unsoundness and a summary of these discloses that for the year the total weight was 792 tons as against 1,127 tons in 1929—a big decrease of 335 tons. The sources of origin of the Central Meat Markets supplies during the past five years are summarised, as is also the average daily delivery into the Markets.

There are a few interesting plates showing the new types of vehicles used for the transport of meat seized as unsound. These illustrations demonstrate clearly the big advance made in this method of transport.

Finally, the value of Smithfield as a teaching centre for Meat Inspectors is justifiably emphasised and due advantage of its facilities seems to be taken.

The Public Health (Meat) Regulations, 1924.

Improvement of a steady nature in the transport and handling of meat continues, except in the case of butchers' own vehicles, where the difficulty of control is emphasised. Butchers do not seem to recognise the need for cleanliness in their delivery vans even when their shops may be highly satisfactory.

All foodstuffs are dealt with in the Veterinary Officer's section of the report and, as we indicated at the beginning, all the information given is both valuable and interesting.

We recommend the report to all engaged in Veterinary Public Health work.

Colonial Agricultural Service Report.

Northern Rhodesia.

Annual Report for 1930.

The Secretary for Agriculture at Livingstone is Mr. J. Smith, M.R.C.V.S., D.V.H., Dip. Agric., who is also

the Director of Animal Health. The present Report deals entirely with plant husbandry.

It is of interest to note that during the year 1930, the following animal commodities were imported into Northern Rhodesia:—

			£
Butter, lb.	341,543 ...	Value	27,632
Eggs, number	2,993,599 ...	,,	25,184
Bacon and Ham, lb.	234,547 ...	,,	17,194
Cattle, number (for slaughter)	10,812 ...	,,	49,373
			£119,383

Stock owners in the Colony have therefore already a local market in addition to that of the adjacent Belgian Congo, where the presence of tsetse fly reduces the capacity for animal husbandry.

The Report of the Department of Animal Health is issued separately.

Colonial Veterinary Service Reports.

Southern Rhodesia.

[**Report of the Division of Animal Husbandry (Chief, J. M. Sinclair, M.R.C.V.S.)**: included in that of the Secretary, Ministry of Agriculture.]

This Division includes the Veterinary Department, Department of Animal Husbandry, Dairy Branch, and Poultry Branch. The Report of the Director of Veterinary Research (Mr. Ll. E. W. Bevan, M.R.C.V.S.) is rendered separately.

Census.—Cattle, 2,529,900.

Staff.—Mr. Sinclair mentions that 65 cattle inspectors are employed.

Disease.—*African (East) Coast fever* is now well under control. There are 3,122 dipping tanks in the territory.

Anthrax.—Eleven outbreaks; 6,000 head inoculated. *Quarter Evil* more prevalent in the Bulawayo District. Only one case of *tuberculosis* was recorded.

Trypanosomiasis.—Suspicion was aroused that biting flies other than tsetse, probably Tabanids, were vectors of infection. In another area treatment by antimony potassium tartrate was instituted to assist farmers in tsetse-infested country to continue farming operations.

Contagious abortion, heartwater, redwater and horse sickness occur.

Pasture.—Important research is in progress under the direction of the Chief Chemist, and is referred to in the Report of that officer. It was rendered possible by a grant from the Empire Marketing Board. In addition to determining the influence of mineral supplements, and the means whereby these can most economically be made to reach the animal, observations were made on methods of improving the feeding values of the natural grasses. This last embraced enquiry into the normal seasonal variation of the constituents, the influence of regular cuttings on the mineral and protein composition, the influence of fertilisers on the botanical and chemical composition, and on the rate of growth and productivity of young animals.

The results up to date indicate that by a proper system of rotational grazing, it is possible considerably to improve the feeding value, especially towards the end of the growing season when mature grasses become deficient. A similar result is obtained by regular cuttings.

Industries.—The Report of the Senior Officer in Animal Husbandry deals with the following:—

Dairying.—A milk recording scheme, now in its second year, is being applied to 32 herds. One new creamery is projected and three new cheese factories have been opened. With the object of raising funds to finance export and to maintain the local price, a voluntary levy on creamery butter has been introduced pending legislative consideration.

Pigs.—A new bacon factory was opened.

The Chief Veterinary Officer reports that 60,871 cattle were exported from Southern Rhodesia, of which 57,000 were for slaughter. Many of these carcasses supplied a contract with Italy. A bounty is paid by the Government on all meat exported overseas.

Uganda.

[**Annual Report of the Veterinary Department of Uganda Protectorate for 1930.** Entebbe, printed by the Government Printer; foolscap, 26 pages with map. Price 2s.]

Census.—Cattle, 1,820,200.

It is estimated that Uganda can carry a bovine population of $4\frac{3}{4}$ millions.

Staff.—Mr. W. F. Poulton is Director of Veterinary Services, assisted by 13 European Veterinary Officers, three Livestock Officers and two Indian graduates. The Deputy Director is Mr. U. F. Richardson. The Research Division is in charge of Mr. R. W. M. Mettam, with Mr. J. Carmichael as Assistant Veterinary Pathologist.

Disease.—*Rinderpest.*—During the year extensions of the outbreak which commenced in 1927, took place slowly and fitfully in a Western direction, and mainly through the migrations of wild game. Very great activity was shown by the Department, and the whole of the East and North of the Protectorate was completely freed from infection: the situation in the West is well in hand.

Double inoculations to the number of 225,000 were carried out; mortality to the Protectorate, despite the widespread area of infection, is considered to have been 25,000.

The native owners complied well with the regulations necessary, although previous experience of this disease might have been expected to arouse a state of panic. Litres of serum numbering 12,900 were purchased from the Kenya Laboratory and 6,376 litres were prepared under field conditions. The potency of both sera is considered to be the same.

Experiments with a formalised spleen vaccine were undertaken by Mr. W. A. Allan, from which it is concluded that it is possible to prepare a rinderpest vaccine in the field, a simple dose of which establishes a marked immunity. Approximately 100 doses of vaccine were prepared from each spleen.

Trypanosomiasis.—The opinion is expressed that infection with *T. brucei* and *T. vivax* in areas infested with *Gl. palpalis* is not serious in either local or imported cattle, provided the animals be reasonably housed and fed.

With assistance from the Colonial Development Fund, experiments for the elimination of *Gl. morsitans* have been commenced in selected areas.

Contagious Bovine Pleuro-pneumonia.—This disease, which was widespread in one Province a few years ago, may now be considered to have been eradicated.

Blackquarter is widespread, but no serious mortality is recorded. Vaccination has been commenced, with satisfactory results.

Anthrax caused considerable mortality in cattle of one area, and fatal cases were recorded among men. Vaccination was not carried out, as it was not wished to embarrass the progress of inoculations against rinderpest.

Tuberculosis.—The occurrence of 13 cases is chronicled among cattle of a nomadic people.

Genetical.—Experimental introductions of improved cattle, sheep and poultry have been made. The initial importation of eggs for setting from England was not successful, but it is hoped to overcome the difficulties and so bring about a much desired improvement by this more simple means of introduction.

Four stock farms have been established and a fifth has been commenced. Owing to the necessity for careful study of local influences upon improved cattle, no spectacular development is recorded.

Considerable progress has been made with the policy of castration and 31,000 operations were performed.

Industrial.—Meat supply was maintained, and owners are showing a greater desire to sell their cattle. The market price of meat has fallen nearly 50 per cent. and is now about 6d. per pound.

Data now exists in regard to the analysis of milk from all parts of the Protectorate.

Hide and skin preparation continued to be demonstrated. Owing to the serious drop in values this trade was materially contracted, but it is hoped that the inception of a market and grading system will prove of benefit to both seller and buyer.

The N.V.M.A. and "Spillers Journal."

We publish below correspondence which has passed between the N.V.M.A. and *Spillers Journal*, concerning a photograph reproduced in their Summer Number in illustration of an article entitled "The Philanthropic Side of Dogdom," in which a brief review of the People's Dispensary for Sick Animals was given by the Founder, Mrs. Dickin, O.B.E.

The Editor,
Spillers Dog and Poultry Journal,
Jacob Street, S.E.1.

September 8th, 1931.

Dear Sir,

The attention of this Association has been drawn by several of its members to the summer issue of your Journal in which a photograph appears depicting a needle being removed from the interior of a dog, by means of an electric magnet.

This picture shows nothing more than a small portable X-ray apparatus, well known to members of the veterinary profession, and which has no power whatsoever to act as a magnet.

Further, it is ridiculous for anyone to state that a swallowed needle could be recovered by a magnet.

The caption beneath the photograph is inaccurate, and entirely misleading to all those who have no knowledge of the subject; indeed, this is an instance of the folly of placing scientific instruments in the hands of the unscientific.

This Association is quite sure that you had no knowledge of the gross error published, but it does think that it would be in the best interests of dog owners generally, and of your Journal in particular, to issue a disclaimer. Certainly, veterinary surgeons are most insistent that this Association should take some action, and I venture to suggest that the publication of this letter would meet the case.

Yours faithfully,
F. Knight,
General Secretary.

. . . . . .

F. Knight, Esq.,
2, Verulam Buildings,
Grays Inn, London, W.C.

September 10th, 1931.

Dear Sir,

Thank you for your letter dated September 8th, and for having pointed out to us an error occurring in the last issue of *Spillers Journal*. The only authority who can be blamed for the error in the wording referred to, is the source from which the original photograph was received, on the back of which was the wording appearing in our Journal.

Looking at the matter broadly, the average man or woman in the street would not be at all critical one way or the other, and no harm therefore has been done.

A few days ago we had a friendly chat with the makers of this portable X-ray apparatus, and they have very kindly given us a story together with an illustration which will appear in the forthcoming issue, and so disabuse people's minds of any misunderstandings that might have arisen. Reference is also made in the story to the fact that it is a very popular apparatus among veterinary surgeons, and widely used by them in the course of their professional activities.

Yours faithfully,
pp. Spillers Limited,
C. M. de Launay,
Advertising Manager.

. . . . . .

September 14th, 1931.

Dear Sir,

I have placed your letter of September 10th before the Chairman of my Committee and am instructed to say, in reply, that this Association is unable to agree that no harm has been done by the publication of the misleading illustration which has been the subject of this correspondence. On the contrary, it is believed that an entirely false impression has been created in the minds of your readers as to the treatment of this case, portraying as it does an impossible procedure which your readers might expect veterinary surgeons to adopt in similar circumstances.

I am to suggest that advantage should be taken of the opportunity presented by the appearance in your forthcoming issue of "A Story and Further Illustration of a Portable X-ray Apparatus," to correct this misrepresentation. With this end in view I enclose a note which I trust you will see your way to insert in that issue.

Yours faithfully,
F. Knight,
General Secretary.

The Advertising Manager,
Spillers Limited.

. . . . . .

"Spillers Journal."

Our attention has been drawn to a photograph on page 14 of our Summer Number, the description under which would appear to imply that a needle in the interior of a dog is being removed by an electric magnet. We are asked to state that this is a misrepresentation, that an electric magnet has no power to achieve such a result, and that the instrument shown in the photograph is a small portable X-ray apparatus, which is not intended for that purpose.

September 15th, 1931.

Dear Sir,

Thank you for your further letter on the matter which has been the subject of some little correspondence between us.

As I explained in my previous letter, an ordinary photograph, together with a photograph of the portable X-ray apparatus referred to, will be appearing in the next issue of our journal.

Arrangements were made in this direction long before hearing from you. We have little doubt that if by chance any wrong impression has gone abroad the action we have decided to take will be to the mutual advantage of all concerned.

Yours faithfully,
pp. Spillers Limited,
C. M. de Launay,
Advertising Manager.

. . . . . .

September 23rd, 1931.

Dear Sir,

I laid the correspondence which has recently passed between us before my Committee on Monday last.

I was directed to inform you that the Committee considered your further reply to be most unsatisfactory. They therefore decided that failing the receipt of an intimation from you that you are prepared to give insertion in the next issue of your Journal to the note which was submitted for that purpose, and a copy of which is enclosed, publication should be given to the correspondence that has passed between us, in an early issue of the *Veterinary Record*, which is the official organ of the veterinary profession in this country.

Yours faithfully,
F. Knight,
General Secretary.

The Editor,
Spillers Dog and Poultry Journal.

. . . . . .

September 25th, 1931.

Dear Sir,

We are in receipt of your letter dated September 23rd. There is an old saying that mistakes happen in the best regulated of families!

With regard to the present episode. We have already told you that a suitably worded paragraph calling attention to the wrong description applied to the portable X-ray apparatus will appear in a forthcoming issue of *Spillers Journal*. The wording to be employed for that purpose must, of course, be left to our discretion.

In any case, we cannot accept your suggestion that we are under any obligation to yourselves in this matter.

Yours faithfully,
pp. Spillers Limited,
C. M. de Launay,
Advertising Manager.

Soviet Russia is starting a meat packing industry. The plant being installed is intended to have a capacity for dealing with 30,000,000 pigs a year—equal to the total product of the United States—and also with cattle, sheep and poultry. There will be 80 abattoirs, with laboratories manned by an army of chemists and veterinary surgeons, and the estimated cost is £3,500,000. The machinery will be purchased entirely in the United States.

It was stated at a meeting of the Cork Corporation that, since his last monthly report, the Chief Veterinary Inspector had condemned 1,655 lb. of meat at the city slaughter-houses and over 27,400 lb. at the Cork bacon factories, as being unfit for food. The meat condemned averaged about 10 per cent. of the amount killed. It was suggested that this was a very high proportion, and that the matter should be gone into by the Department of Agriculture.

In Parliament.

The following questions and answers have been recorded in the House of Commons recently:—

Underground Haulage.

Mr. Freeman asked the Secretary for Mines what kind of haulages are used underground in mines and the total horse-power operating the various haulages; whether there are, in the view of his Department, any advantages in the use of electrical power over compressed air as motive power; and the approximate ratio of horse haulage to the total of mechanical haulage employed underground in mines in each of the inspection divisions?

Mr. Foot: Mineral is transported underground by various forms of rope haulage, by mechanical conveyors, by horse haulage, by manual labour, to a small extent by suitable locomotives, and by manifold combinations of these methods. In some circumstances, rope haulages and conveyors can be operated more economically by electricity than by compressed air, but the question whether electricity may be used is primarily and strictly governed by considerations of safety. The aggregate horse-power of electric motors in use below ground for haulage, at June 30th, 1930, was 400,818, and for conveyors and loaders, 22,426. I regret I am unable to give any corresponding figures as to other forms of mechanical power, and consequently unable also to answer the last part of the question. The number of horses employed below ground was 49,243.

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Horses (Employment Underground).

Mr. Freeman asked the Secretary for Mines the total number of animals employed underground in all the mines of the coal-producing countries, excepting Britain, for each of the last ten years?

Mr. Foot: I regret that this information is not available except in the case of Prussia during the years 1926 to 1929, when the number of horses employed below ground was 2,560, 2,512, 2,218 and 2,353 respectively.

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Pit Horses and Ponies.

Mr. Freeman asked the Secretary for Mines whether he has considered representations submitted from miners' lodges, churches, and various kinds of societies and organisations, during recent months, supporting proposals for a single-shift working day for pit horses and ponies; for improving regulations to provide better-lighted roadways of adequate height and width, and properly laid, and without holes being cut between sleepers, to allow the animals to work in greater comfort and less danger; for a regulation prohibiting the use of ponies on steep inclines, and also the practice of attaching horses and ponies in front of loaded tubs going downhill; and the training of boys for at least one year before they are certified to take charge of a pony underground for driving purposes; and whether he intends to take steps immediately to adopt these reforms?

Mr. Foot: I have not yet had opportunity to consider these representations in detail, but generally I am aware of their purport. As my predecessors have done, I shall reinforce by my personal attention the unremitting efforts of my Department to ensure that the present standard, which generally, to the credit of the industry, is a good one, shall be maintained and where necessary improved.

Mr. Freeman: Is it the intention of the hon. Gentleman to follow the official inquiry made into these matters by his predecessor, with a view to further improvements?

Mr. Foot: I thought my answer implied that. I have reason to believe that at all these collieries proper inspections are being made, and wherever action is necessary it will be taken.

Mr. R. Richardson: Has the hon. Gentleman in his mind the question of compulsory orders for sufficient height and width of roadways for ponies and traffic to pass?

Mr. Foot: That is a question of detail, which I would prefer to be put upon the Order Paper.

Mechanisation.

Lieut.-Commander Kenworthy asked the Financial Secretary to the War Office, whether any change is contemplated in the programme for mechanisation of the Army, in view of the financial situation?

The Financial Secretary to the War Office (Mr. Duff Cooper): There is no programme. The mechanisation of the Army in the past has been governed from year to year by the financial and other considerations involved, and in taking any further decisions full regard will be had to the present financial situation.

Lieut.-Commander Kenworthy: Will the Hon. Gentleman be good enough to tell me in a little more detail; is the War Office going on building tanks?

Mr. Cooper: There is no alteration in this year's programme whatever. The question of what we shall do next year will have to be settled when we draw up the Army Estimates for the coming year.

Mr. T. Williams: Will the hon. Gentleman recommend to his leader that he should adopt here the same policy that he has adopted in regard to the other economies?

Notes and News.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

Oct. 5th.—N.V.M.A. Committee Meetings at 2 Verulam Buildings, Gray's Inn, W.C.1.

Oct. 6th.—N.V.M.A. Committee Meetings at 2 Verulam Buildings, Gray's Inn. N.V.M.A. Council Meeting at 10 Red Lion Square, W.C.1.

Oct. 7th.—R.C.V.S. Committee Meetings.

Oct. 8th.—R.C.V.S. Committee Meetings.

Oct. 8th.—Meeting of Lincolnshire and District Division, N.V.M.A., at Lincoln.

Oct. 9th.—R.C.V.S. Committee and Council Meetings.

Oct. 15th.—Meeting of the Western Counties Division, N.V.M.A., at Taunton.

R.C.V.S. Obituary.

Brown, William, J.P., M.R.C.V.S., 85 Pembury Road, Tottenham, N., late of Wiveliscombe, Somerset. Graduated London, March 31st, 1884. Died September 27th, 1931; aged 70 years.

Bruce, Joshua Kidd, 90 Talbot Road, Highgate, N.6. Graduated Glasgow, December 23rd, 1892. Died September 23rd, 1931; aged 58 years.

The late Mr. J. K. Bruce.

"Mr. Joshua Kidd Bruce was personally unknown to most Londoners, but his name was familiar to them, for it appeared on the side of every L.C.C. tramcar until recently as general manager," says *The Times*.

"Born at Strathmore in 1871, he came to London as a veterinary surgeon, and took charge of the stud of horses then belonging to the London Tramways Company. When that undertaking was bought by the London County Council, he became a municipal employee, and turned to administration when the system was electrified in 1899. For 15 years he assisted in the management and watched the growth of the undertaking.

"When in 1925 he became general manager he was faced with intense difficulties. There was severe competition from the developing motor-omnibus, and there were many who openly advocated 'scrapping' the trams. Mr. Angus Scott, in his speech to the Council on the trams in that year, had to report that the surplus on working was insufficient to meet debt charges, while not long afterwards a former secretary to the Road Board wrote an article which was frankly pessimistic. By this time, however, Mr. Bruce was feeling his feet. His long experience of the system stood him in good stead, and he determined to fight the competition. Slowly new ideas and new methods were introduced. He speeded up the cars, thus competing with the omnibus. This quicker service enabled him to reduce the number of cars in operation, thus reducing costs materially. This accomplished, he began to make the cars more comfortable and attractive to the public. Among other improvements an anti-rocking device was fitted and the wooden seats were upholstered and furnished with springs. Results soon came, and the London County Council trams produced profits. The Council were generous in their recognition. Not only were his services publicly acknowledged, but he was given money grants and paid a salary of £2,500 a year.

Mr. Bruce leaves a widow and two children."

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

Minimum Price Restriction of "Grade A" Milk.

To the Editor of The Veterinary Record.

Sir,—Is it not possible that the action of the Ministry of Health in fixing a minimum price below which Grade "A" milk may not be sold has restricted the production and sale of that very desirable commodity?

During the past four years I have made enquiries of many producers of Grade "A" milk as to the relative cost of producing graded and non-graded milks. With one exception they have assured me that no additional monetary outlay is necessary for the production of graded milk, but they all complain of the difficulty of disposing of their product because the public decline to pay the extra price.

One farmer asked me whether I could explain the attitude of his own doctor who recommended Grade "A" milk to all his patients but refused to pay the extra price for his own consumption. I suggested that probably the doctor boils all his milk. Actually he is getting Grade "A" below price, as the farmer produces nothing else!

Another large producer of Grade "A" milk sold all his in bulk to a retailer who, he discovered, sold it as pasteurised milk! As he was unable to get any more for Grade "A" he started to build up, at my suggestion, a tuberculosis-free herd on one of his two farms when he was driven out of business by the heavy losses on his arable land.

It seems feasible to suggest that if Grade "A" milk could be retailed at the same price as non-graded milk the consumption of milk would be greatly increased to the mutual benefit of all concerned and the graded article would oust the non-graded, whereas under present conditions many people who will not, or cannot, afford Grade "A" milk are afraid of non-graded milk and so use as little as possible.

I personally know three medical men who advise all their patients never to drink milk at all.

It has always seemed to me that the graded milk producers may unwittingly assist in the elimination of tuberculosis, as they certainly do not keep tuberculous animals in their herds to the point of emaciation, as is too often seen elsewhere.

Faithfully yours,
David Eric Wilkinson.

Oakwood,
Chigwell,
Essex.
September 26th, 1931.